

bond strength was measured as 16.0 MPa and 22.0 MPa, respectively, without separate etching step.

#### 1P-SEA Example 10

As described in the previous patent examples, 1P-SEA formulations can use initiators combination of L-TPO and CQ with different coinitiators (different amines, such as DMABN, EDAB, or DHEPT) to make the 1P-SEA compatible with both dental halogen QTH or LED curing lights. Table 8 compares bond strength of three different experimental 1P-SEA differing only in aromatic amines. DHEPT and EDAB are two most commonly used co-initiators for CQ. The formulations containing either DHEPT or EDAB did not lead to acceptable balanced properties. Only the formulation incorporating DMABN exhibits the superior balance of bond strength, storage stability and compatibility with different curing lights (dental QTH and LED curing lights). DMABN is the first time ever used in any commercial dental adhesive.

TABLE 8

24 hr Shear Bond Strength of 1P-SEA Containing Different Co-initiators					
Sample I.D.			1P-SEA containing DMABN	1P-SEA containing DHEPT	1P-SEA containing EDAB
Human Dentin	RT	QTH Light	23.2 (3.9)	NT	17.0 (7.5)
SBS (MPa):	stored	LED light	22.0 (4.0)	NT	15.6 (5.7)
Mean (SD)	50° C. 3 weeks	QTH Light	15.3 (4.2)	NT	14.5 (6.9)
		LED light	15.8 (6.1)	NT	16.8 (6.8)
Human Enamel	RT	QTH Light	26.4 (5.3)	13.5 (6.7)	32.7 (7.2)
SBS (MPa):	stored	LED light	32.0 (3.0)	NT	30.1 (7.3)
Mean (SD)	50° C. 3 weeks	QTH Light	26.7 (5.3)	NT	7.6 (2.0)
		LED light	35.3 (7.9)	NT	24.8 (13.3)

What is claimed is:

#### 1. A dental adhesive comprising:

- (i) from about 5 to about 70% by weight of polymerizable acids components selected from the group consisting of dipentaerythritol pentaacrylate phosphoric acid ester, 4,4'-oxydiphenylether 1,1',6,6'-tetracarboxylic acid-1, 1'-(2-methacryloxy)dimethacrylate and mixtures thereof;
- (ii) from about 1 to about 30% by weight of hydrophilic methacrylate;
- (iii) from about 1 to about 25% by weight of hydrophilic difunctional (meth)acrylate;
- (iv) from about 1 to about 30% by weight of hydrophobic difunctional (meth)acrylate;
- (v) from about 0.1 to about 5% by weight photoinitiators selected from the group consisting of diphenyl (2,4,6-trimethylbenzoyl)phosphine oxide, camphorquinone/

dimethylaminobenzonitrile combination and diphenyl (2,4,6-trimethylbenzoyl)phosphine oxide/camphorquinone/4-ethyl dimethylaminobenzoate combination;

- (vi) from about 0.1 to about 5% by weight curing additives selected from the group consisting of aromatic sulfinate salts;
  - (vii) from about 0.1 to about 5% by weight cetylamine hydrofluoride;
  - (viii) from about 0.05 to about 2% stabilizer;
  - (ix) from about 1 to about 40% water; and
  - (x) from about 5 to about 60% water-miscible polar organic solvent selected from the group consisting of acetone and alcohol.
2. A dental adhesive comprising:
- (i) from about 5 to about 50% by weight of polymerizable acids components selected from the group consisting of dipentaerythritol pentaacrylate phosphoric acid ester, 4-methacryloxyethyltrimellitic anhydride and mixtures thereof;
  - (ii) from about 1 to about 20% by weight of hydrophilic methacrylate;
  - (iii) from about 1 to about 15% by weight of hydrophilic difunctional (meth)acrylate;
  - (iv) from about 1 to about 30% by weight of hydrophobic difunctional (meth)acrylate;
  - (v) from about 0.1 to about 5% by weight photoinitiators selected from the group consisting of diphenyl (2,4,6-trimethylbenzoyl)phosphine oxide, camphorquinone/dimethylaminobenzonitrile combination and diphenyl (2,4,6-trimethylbenzoyl)phosphine oxide/camphorquinone/4-ethyl dimethylaminobenzoate combination;
  - (vi) from about 0.1 to about 5% by weight cetylamine hydrofluoride;
  - (vii) from about 0.05 to about 2% by weight stabilizer;
  - (viii) from about 1 to about 35% by weight water; and
  - (ix) from about 5 to about 60% by weight water-miscible polar organic solvent selected from the group consisting of acetone or alcohol.

3. The dental adhesive of claim 2, wherein the hydrophilic difunctional (meth)acrylate comprises 3-(acryloyloxy)2-hydroxypropyl methacrylate.

4. The dental adhesive of claim 2, wherein the hydrophobic difunctional (meth)acrylate is a urethane dimethacrylate.

5. The dental adhesive of claim 4, wherein the urethane dimethacrylate is 1,6-bis[methacryloyloxyethoxycarbonylamino]-2,4,4-trimethylhexane.

6. The dental adhesive of claim 2, wherein the hydrophilic methacrylate comprises 2-hydroxyethyl methacrylate.

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